DOCUMENT RESUME

ED 445 741 JC 000 678

TITLE	An Analysis of Developmental Education at Michigan's Associate Degree-Granting Institutions.
INSTITUTION	Michigan State Dept. of Education, Lansing.
PUB DATE	1999-05-00
NOTE	33p.; Study prepared by the Developmental Education Steering Committee.
PUB TYPE	Reports - Research (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Academic Achievement; *Community Colleges; *Developmental Studies Programs; *Outcomes of Education; Student Development; Two Year Colleges
IDENTIFIERS	*Michigan

ABSTRACT

This report provides a description of how developmental students perform in 26 of Michigan's associate degree-granting institutions. The study finds that 67% of students enrolled in developmental English passed; 52% of students enrolled in developmental math passed; and 67% of students enrolled in developmental reading passed. It is more common for a student to either pass all developmental courses or none of them. Students who pass their developmental courses are more likely to pass a subsequent college-level course in a related subject than are students who fail the developmental course. Enrolling in college-level courses directly after finishing the developmental course, rather than waiting a few semesters, does not make a difference in whether the student passes the college-level course. Developmental students are more likely to remain enrolled at their institution longer. There is no difference between students who pass their developmental courses and students who never took a developmental course in how they perform in their first college-level math and political science courses. Students who never enrolled in a developmental course are more likely to pass college-level English courses than are those students who passed either developmental English or developmental reading prior to enrolling in college-level English. Grouping institutions by enrollment resulted in no one group standing out as having the greatest success in developmental education. Contains 15 references. (VWC)

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An Analysis of Developmental Education at Michigan's Associate Degree-Granting Institutions

Prepared for the Michigan Department of Education

State of Michigan

May, 1999

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EXECUTIVE SUMMARY

In spring 1998, the Developmental Education Steering Committee formed for the purpose of planning and overseeing a study examining the performance of developmental education students. They chose a cohort-based study design that compared the performance of developmental and non-developmental students in Michigan's associate degree-granting institutions. All of Michigan's community colleges and associate degree-granting public colleges and universities were invited to participate in the planning and administration of the study. Of the 30 community colleges and four-year institutions invited, 26 community colleges and three four-year institutions chose to participate.

Four basic research questions guided the study: 1) How do developmental students perform; 2) Does taking and passing a developmental course make a difference in subsequent academic success?; 3) Is there a difference in how students who pass developmental courses perform in subsequent courses and how students who have not taken developmental courses perform in similar courses? and 4) What institutional structures, policies, or activities correlate with developmental students' success?

The participating institutions provided data from 1995 to 1998 on a total of 4,406 randomly selected students, all of whom were "first time in any institution" in Fall 1995. 51% (2,238) of those students were identified as developmental and 48% were full-time students in Fall 1995. Statistical analyses included basic frequency and descriptive analyses; t-tests, ANOVAs, and chi-squares; and correlational analyses.

Findings

- The average last semester attended for all students was Winter 1997 (semester starting in January 1997).

- 67% of students enrolled in developmental English passed; 52% of students who enrolled in developmental math passed; and 67% of students who enrolled in developmental reading passed.

- It is more common for a student to either pass all developmental courses or pass none of them: 52% passed all of their developmental courses, regardless of the number of courses they took (one to three courses were possible); 33% did not pass any of their developmental courses; and 15% passed one-third, one-half, or two-thirds of their developmental courses.

- Students who pass their developmental courses are more likely to pass a subsequent college-level course in a related subject than are students who fail the developmental course and still enroll in a related subsequent college-level course.

- Enrolling in college-level courses directly after finishing the developmental course, as opposed to waiting for two or more semesters, does not make a difference in whether the student passes the college-level course.

- Of the 1,182 students who enrolled in developmental English during or after Fall 1995, 379 (32%) enrolled in and passed college-level English by Fall 1998.

- Of the 1,536 students who enrolled in developmental math during or after Fall 1995, 223 (15%) enrolled in and passed college-level math by Fall 1998.

- Non-developmental students have higher GPAs and complete more of the credits they attempt.

- Developmental students are more likely to remain enrolled at their institution longer.

- There is no difference between students who pass their developmental courses and students who never took a developmental course in how they perform in their first college-level math and political science courses.

- Students who never enrolled in a developmental course are more likely to pass college-level English courses than are those students who passed either developmental English or developmental reading prior to enrolling in college-level English.

- Grouping institutions by enrollment resulted in no one group standing out as having the greatest success in developmental education. Although there are indications that centralized developmental education efforts make no difference in helping developmental students, further studies are needed to relate developmental student success to institutional structures and policies.

BACKGROUND

In 1988, the State of Michigan Department of Education conducted its first study of postsecondary developmental education at Michigan public community colleges. The study was limited to those institutions receiving Perkins grant funding, resulting in participation by approximately 30 schools. In 1990, the study was repeated with limited modifications. At that time, a plan was envisioned to periodically review the progress of developmental education within the State. Consequently, a third study was conducted in 1997. The study was aimed at providing a comprehensive overview of the scope, nature, and practices of student academic assessment and developmental education services at Michigan's community colleges. A twenty-six member committee, representing the Michigan State Department of Education, 21 Michigan community colleges and two four-year institutions designated to act as community colleges in their region, participated in planning the study. The final report was completed in October, 1997.

In spring 1998, a Developmental Education Steering Committee was formed for the purpose of planning and overseeing the current research – envisioned as a follow-up to the 1997 study. The primary goal of the Steering Committee was to extend the 1997 descriptive study by examining the performance of developmental education students in terms of academic achievement. A corollary goal was to identify institutional structures, policies and activities (acquired in the 1997 study) that correlate with developmental students' performance.

All of Michigan's community colleges and associate degree-granting public colleges and universities were invited to participate in the planning and administration of the study. Of the 30 community colleges and four four-year, associate degree-granting institutions invited, 26 community colleges and three four-year institutions chose to participate. The participants included:

Alpena Community College
Bay de Noc Community College
Delta College
Ferris State University
Glen Oaks Community College
Gogebic Community College
Grand Rapids Community College
Henry Ford Community College
Jackson Community College
Kalamazoo Valley Community College
Lake Michigan College
Lake Superior State University
Lansing Community College
Macomb Community College
Mid Michigan Community College
Monroe County Community College
Montcalm Community College
Mott Community College
Muskegon Community College
North Central Michigan College
Northern Michigan University
Northwestern Michigan College
Oakland Community College
Schoolcraft College
Southwestern Michigan College
St. Clair County Community College
Washtenaw Community College
Wayne County Community College
West Shore Community College

INTRODUCTION

For more than twenty years, developmental education courses have remained the most offered courses in community colleges (Roueche & Roueche, 1999). This commitment to remediation is directly linked to the central value and founding mission of most community colleges – to provide open access to all Americans who wish to pursue postsecondary education. The challenge for these institutions is to balance performance expectations and an open door policy. As entering students are increasingly underprepared for college-level coursework, providing open access necessitates provision of remedial services that enable students to succeed. Ignoring the remedial needs of students – adopting a "sink or swim" philosophy – is irresponsible at best and certainly disregards the open door mission. But the increasing numbers of students needing remediation and the consequent expense has resulted in national debate over questions such as, Who should pay for developmental education? Who is responsible for providing remediation? Does developmental education work?

Remedial or developmental education is hardly a new phenomenon. In 1874, faculty at Harvard University developed a special course to remediate writing deficiencies of incoming freshmen (reported in Sugarmen & Kelly, 1998), and in 1894, Wellesley College developed one of the first remedial courses for college students (reported in Cross, 1976). As new colleges were established across the country, it was not uncommon for them to provide remedial courses geared to the development of reading and learning skills of incoming freshmen. But developmental education remained a very small component of higher education until the 1960s, when demands for equal educational opportunities provided the impetus for broad-based, remedial education at the postsecondary level. New "support" services were created and remedial courses were added to provide a conduit for students representing socially, economically, and educationally deprived groups – many of whom were previously shut out of the higher education system.

In the last thirty years, remedial education has broadened its original focus of rectifying discreet skill deficiencies. Most programs today now encompass full development of students with programs designed to help students master learning strategies and develop self-confidence (McCabe & Day, 1998). Approximately 42% of high school graduates enroll in college and 29% of all first-time freshmen enroll in at least one remedial reading, writing, or mathematics course (NCES, 1996). Almost 100% of public two-year colleges offer remedial courses in each of these subject areas (NCES, 1996) and the total national expenditures for postsecondary remedial education has been estimated at approximately $1 billion (Roueche & Roueche, 1999). A recent report by the Illinois State Board of Higher Education (1997) points out that even though the *percentage* of students needing remedial education has declined in the last hundred years, much higher *numbers* of students are continuing their education beyond high school. In 1991, 11.5% of the Illinois community college students took at least one remedial course. By 1996, that percentage had increased to 14.1%.

Considering these statistics, it is not surprising that developmental education has caught the attention of both legislators and the general public. More and more states are requiring outcome evidence from their colleges and universities, and statewide policies governing the provision of remedial education services are becoming commonplace. Colorado, Florida, and South Carolina now prohibit remedial education at four-year institutions – limiting remedial programs to two-year colleges – and eight other states (Georgia, Maryland, Minnesota, Missouri, Nevada, New York, Ohio and Virginia) are considering similar statutes. In six states (Florida, New Jersey, Montana, Washington, West Virginia and Wisconsin), legislation is under consideration to require students to pay back the cost of their remedial coursework (Kentucky Council on Postsecondary Education, 1996).

Developmental education in Michigan continues to remain free from state-mandated governing policies; however, assessment of postsecondary developmental education continues to grow. The current study is seen as a step in beginning to identify the effectiveness of developmental education courses and services in Michigan's community colleges and public associate degree-granting institutions. The participating institutions are committed to developing tracking and assessment systems to help them determine developmental education policies for their respective institutions so that the balance between open access and institutional quality can be optimized.

This report begins with a brief review of similar studies conducted by other states and colleges. This is followed by a summary of the research questions, study methods, and findings from the Michigan study of postsecondary developmental education conducted during Fall 1998.

REVIEW OF RELATED LITERATURE

Traditionally, evaluation of remedial education in postsecondary institutions has been limited to course evaluations; however, increasing enrollments in remedial education courses and related funding requirements have increased administrative and legislative concern regarding outcomes assessment. The purpose of remedial or developmental education is "to enable students to gain the skills necessary to complete college-level courses and academic programs successfully" (Weissman, Bulakowski & Jumisko, 1997). Based on this premise, a number of states and colleges have implemented tracking systems and conducted research studies to evaluate whether or not this goal is actually being achieved. The indicators of success used most frequently in these studies are: 1) student persistence at the college; 2) pass rates in developmental courses; 3) passing grades in related college-level coursework; 4) students' cumulative GPA, and 5) ratio of credits attempted to credits earned. Results from these studies have been useful in helping institutions develop curriculum and determine institutional policies for placement in remedial courses (Weissman, et. al; Thornley and Clark, 1998; Walleri, 1987,).

In 1983, Kulik, Kulik, and Shwalb conducted a meta-analysis of findings from 60 studies on postsecondary programs for high-risk and disadvantaged students. They found that remedial programs were related to improved persistence and cumulative grade point averages. Several other studies compared cohorts of students who took one or more developmental courses with students who did not take developmental courses. An evaluation study by Walleri (1987) compared participants in Mt. Hood Community College's (Oregon) required "Guided Studies" program with a comparable group of students who attended the college prior to introduction of the program. He found that persistence was significantly higher in the Guided Studies group (41% vs. 19% after two years) but GPA was about the same in both groups. Thornley and Clark (1998), in another evaluation study that compared developmental and non-developmental students at Trident College (South Carolina), also found that developmental students had higher persistence rates than non-developmental students over a three-year period but slightly lower cumulative GPAs.

Higher persistence rates for students enrolled in developmental courses is a consistent trend, as indicated in several other studies. Sinclair Community College (1994), in a three-year study comparing students who participated in remedial courses with students who were recommended but chose not to participate in remedial courses, also found that persistence was significantly higher in the cohort of students who chose to enroll in remedial coursework. At the College of Lake County (Illinois), Weissman, et al. found that students who chose to remediate had significantly higher persistence rates than both college-level students and skill-deficit students who chose not to enroll in remedial courses. Similar findings are reported by Haeuser (1993) who found that developmental students had higher persistence rates than the college general population. Walleri (1987) suggests that one possible explanation for the consistently higher persistence rates of developmental students is that completion of college-

level courses is delayed due to enrollment in developmental courses. He also suggests a less cynical explanation – that students enrolled in developmental programs receive a high level of support that improves student motivation and self-esteem, and prevents enrollment in courses for which students are destined to fail. It has also been suggested that developmental students continue to persist because they feel more prepared (Sinclair Community College).

With regard to GPA, the literature is also consistent in reporting that developmental students earn the same or slightly lower GPAs than non-developmental students (Seybert & Soltz, Thornley & Clark; Weissman et. al.). This does not mean that developmental courses are not effective in raising students' GPA, however. In a six-year study of students testing deficient in all academic areas (reading, English and math), Jur (1998) found that the number of developmental courses taken was positively correlated with overall student GPA.

The data concerning the relationship between student success in developmental courses and success rates in related college-level courses is also very convincing. Of the studies we reviewed that examined this relationship, all concluded that taking developmental coursework was positively related to success in related college-level courses (Kentucky Council on Postsecondary Education, 1998; Seybert & Soltz, 1992; Sinclair Community College, 1992; State of Illinois Board of Education, 1997; Thornley & Clark, 1998; Weissman et. al., 1995 & 1997).

A final trend that is evident in the remedial education literature is that developmental students tend to have a lower ratio of credits attempted to credit earned than their college-level counterparts (Seybert, et al, 1992; Weissmann et al, 1995 & 1997). This is also true for studies that compared skill-deficit students who took remedial courses with comparable students who chose not to remediate. Those who took remedial courses had a higher rate credits attempted to credit earned and earned higher overall GPAs (Weissman et al, 1995 & 1997; Jur, 1998). As a group, developmental students attempt more courses and persist longer but have slightly lower GPAs and fail or withdraw from courses at a higher rate than their college-level counterparts.

In light of these studies, a study design and research questions were developed to evaluate performance of developmental students in Michigan's community colleges and associate degree-granting public universities. These are described in the next section of this report.

RESEARCH QUESTIONS

Four basic research questions guided this research:

1. How do developmental students perform?

2. Does taking and passing a developmental course make a difference in subsequent academic success?

3. Is there a difference in how students who pass developmental courses perform in subsequent courses and in how students who have not taken developmental courses perform in similar courses?

4. What institutional structures, policies, or activities correlate with developmental students' success?

Under each of these four research questions there are several sub-questions of interest that will be discussed in the Results section.

METHODS

In Fall 1998, the Developmental Education Steering Committee convened to develop a design for studying the success of developmental students in the state of Michigan. With the help of two consultants, this committee considered study designs used by other states. They chose a cohort-based study design that would compare the success of developmental to non-developmental students in Michigan's associate degree-granting institutions (see Appendix A for a list of all the institutions invited to participate in the study).

After lengthy discussions regarding the variables to be included in this study, the consultants created two matrices that the institutions would use as a guide in gathering data on their students (see Appendix B). All of the eligible institutions were invited to a group meeting to discuss the study design and matrices on November 13, 1998. At this meeting, the study design was presented, discussed, and amended.

The final design stipulated that participating institutions would select two random samples of students from their institutions. The first sample was comprised of first time to any college (FTIAC) students in Fall 1995 who were enrolled in a developmental English, math, and/or reading course in the Fall 1995 semester. This sample is the "developmental sample." The second sample was comprised of FTIAC students in Fall 1995 who never enrolled in a developmental course—this sample is the "non-developmental sample." Sample sizes were assigned based on enrollment numbers. The largest associate degree-granting institutions generated 100 students in each of their two samples, the middle-sized institutions generated 75 students in each of their two samples, and the smallest institutions chose 50 students in each of their two samples (see Appendix C for a list of institution sample sizes).

For the developmental sample, institutions were asked to provide information on 26 variables; for the non-developmental student sample, institutions were asked to provide information on 17 variables (see Appendix B). Participating institutions were asked send their completed matrices to the consultants by December 31, 1998. By February 28, 1999, the consultants had received information from 29 of the 31 eligible institutions (see Appendix C for a list of participating institutions and the number of students cases sent from each institution). The data was entered in SPSS 8.0 for Windows. After some cases were deleted from the sample[1], there were 4,406 students in the database.

In order to answer Research Question Four, we needed to add variables from the 1997 Developmental Study to our database. Twenty-eight of the 29 participating institutions had completed the 1997 survey. We added 36 variables from the 1997 study, including whether the institution's developmental efforts were centralized, whether they mandated assessment and/or

[1] For example, some institutions mistakenly chose students who were enrolled in developmental courses other than English, math or reading in Fall 1995. If the developmental student had not been enrolled in a developmental English, math, or reading course in any semester, the case was deleted.

placement, how they delivered their developmental courses, and what services they offered for developmental students.

Once the database was set up, we recoded and computed several new variables. For example, we created variables to represent whether a developmental student who passed developmental math passed a subsequent non-developmental math course. We also created more basic variables, such as a credits completed to credits attempted ratio (excluding any students who had more credits completed than credits attempted), and a variable to represent the pass rate for all developmental courses taken by the student. Please see Appendix D for all of the variables in our database and their definitions.

After we had computed several new variables, we ran basic frequency and descriptive analyses to get a better understanding of our database and of how students were performing on basic variables. These analyses were instrumental in answering our first research question. In order to test for mean differences between and among groups, we ran t-tests and ANOVAs. We were mainly interested in mean differences between developmental and non-developmental students, but we also tested for mean differences between full- and part-time students and between those who had passed developmental courses and those that did not. We also ran chi-squares to test for differences among the five institutional groups[2]. Finally, we ran some correlations to determine if there were relationships between developmental student performance and institutional size and/or the number of support services offered by an institution.

[2] See Table X for a list of the institutional groups (we used the same groups used in the 1997 Developmental Education study).

RESULTS

Of the 4,406 students in our database, 51% (n=2,238) are developmental[3], and 48% were full-time students in Fall 1995. Table 1 presents an overview of the students in our database.

Table 1
General Descriptives of Students in Database

	GPA	Credits Attempted	Credits Completed to Credits Attempted Ratio	Last Semester Attended
Mean (Standard Deviation)	2.20 (1.19)	32 (26)	.74 (.33)	Winter 97 (3 semesters)

Although the average last semester attended for these students was Winter 1997[4], many students left the institution earlier. All students were first enrolled in Fall 1995 and for 21% of these students, Fall 1995 was also their last semester in attendance. Nearly half of all students (49%) were gone before the Winter 1997 semester. However, some students (15%) were still enrolled in Fall 1998 – the last semester for which we recorded enrollment data[5]. Students with higher GPAs were more likely to be enrolled longer at an institution ($R=.43, p < .01$). Full-time students were also likely to be enrolled longer at the institution ($t = -3.49\ p < .0001$) and to have a higher GPA ($t = -3.27\ p < .001$).

Research Question One

Our first research question asked, how do developmental students perform? Table 2 presents the percentage of students who passed their highest-level developmental course(s) taken in or after Fall 1995. This table also specifies the percentage of students who passed when the students who withdrew from the course were taken out of the sample. Therefore, one can see what the pass rates were for students who stayed in the course, since some students who withdrew were passing at the time of withdrawal. However, since most institutions did not provide details on whether students were passing at the time of withdrawal, all further analyses include students who withdrew as students who *did not pass*[6].

[3] Although we had intended that exactly 50% of our sample would be developmental, Lake Superior State University had more developmental than non-developmental students in their associate degree programs and could not provide equal sample sizes.
[4] For all institutions, we recoded semesters into 3 options: Fall, Winter, and Spring/Summer.
[5] If institutions recorded data on semesters beyond Fall 1998, we recoded the semester to Fall 1998.
[6] Withdrawal grades were also included as failing grades for the non-developmental students.

Table 2. Numbers and Percentages of Students Who Took and Passed Developmental English, Math, and Reading

Developmental Course	Number Enrolled	Percentage who Passed	Number who Withdrew	Percentage who Passed, Minus Withdrawals
English	1182	67%	113	78%
Math	1536	52%	211	66%
Reading	755	67%	71	76%

We also considered the overall pass rate for all developmental courses taken by a student. Slightly more than half of the developmental students (52%) passed all of their developmental courses, regardless of the number of courses they took (one to three courses were possible). One third of the students (33%) did not pass any of their developmental courses, regardless of the number of courses they took. The remaining 15% passed either one-third or one-half or two-thirds of their developmental courses. Apparently, it is more common for a student to either pass all developmental courses or none of them. Full-time students were more likely to pass their developmental English course and to have a better pass rate for all developmental courses taken ($t = -2.29, p < .05$).

As was the case for all students, full-time developmental students were also more likely to have higher GPAs ($t = -3.24, p < .01$) and to be enrolled longer at the institution ($t = -3.49, p < .001$). Similarly, those students who did pass their developmental courses were more likely to have remained enrolled in the institution longer than those who did not pass their developmental courses. The students who passed their developmental English course were more likely to have a higher last semester at $R = .31, p < .01$. Those students who passed their developmental reading course were more likely to have a higher last semester at $R = .28, p < .01$. Those who had a higher pass rate for all developmental courses were also more likely to have a higher last semester at $R = .28, p < .01$.

Research Question Two

Research Question Two asked whether enrolling in and passing developmental courses made a difference in terms of subsequent academic success. In order to begin exploring this question, we wanted to know how many developmental students went on to pass non-developmental courses in similar subject areas. Table 3 presents this information.

Table 3. Pass Rates for Students Who Passed Developmental Course and Subsequently Enrolled in a Non-Developmental Course

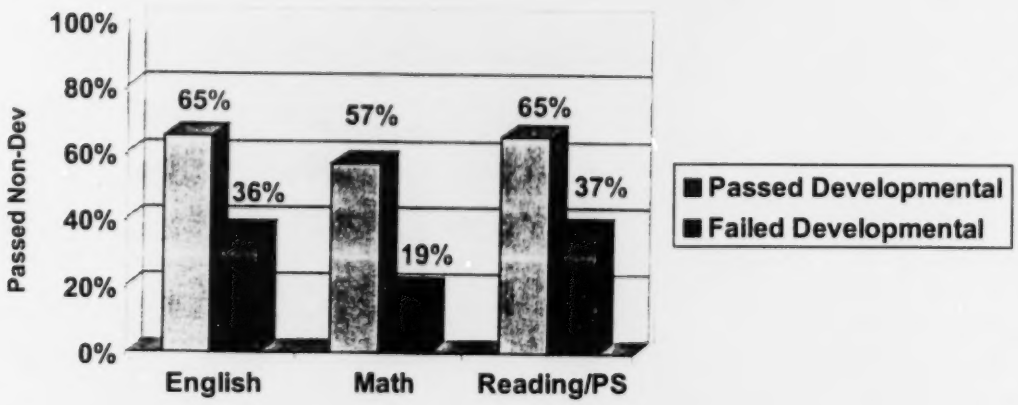
Non-Developmental Course	Number of Students Who Passed Developmental Course and Subsequently Enrolled in a Non-Developmental Course	Percentage who Passed Non-Developmental Course
English	533 (68% of all who passed developmental English)	65%
Math	359 (45% of all who passed developmental math)	57%
Political Science	162 (32% of those who passed developmental reading)	65%
English (developmental reading)*	262 (52% of those who passed developmental reading)	59%

*We also calculated data on students who passed developmental reading and subsequently enrolled in non-developmental English.

According to Table 3, 65% of the developmental students pass college-level English after passing their developmental English course. For math, the percentage is 57% and for political science, the percentage is 65%. We also tracked how developmental reading students did in a subsequent college-level English course. Of all the developmental reading students who pass their reading course and enroll in college-level English, 59% pass.

Since not all institutions require that students pass developmental courses before enrolling in non-developmental courses, we wanted to discern whether passing a developmental course made a difference in terms of success in subsequent non-developmental courses in similar subject areas. The following Figure displays these results.

Figure 1
Percentage of Students Who Passed Subsequent Non-Developmental Courses, by Whether They Passed Developmental Course in Similar Subject Area



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The pass rates in each of these three subject areas are significantly different at $p < .01$[7]. Students who pass developmental English are more likely to pass a college-level English course than are those students who fail developmental English and still go on to take college-level English. This pattern is the same for students in developmental math. For students in developmental reading, those who pass are more likely to pass political science than are those who fail developmental reading.

These groups display significant differences despite the variance in the number of students within the distinct groups. For those students who went on to take non-developmental English, 532 had passed developmental English and 86 had failed. For those students who went on to take non-developmental math, 359 had passed developmental math and 96 had failed. For those students who went on to take political science, 162 had passed developmental reading and 27 had failed. There was no significant difference between students who passed developmental reading and those who did not pass developmental reading on whether they then passed a subsequent non-developmental English course.

For the students who passed developmental English and then went on to take college-level English, 68% took the college-level course in Winter 1996 (the following semester). The remaining 32% took it after the Winter 1996 semester, with half of these students enrolling in the college-level English course in the Fall 1996 semester. For those students who enrolled in the college-level English course in the following semester, 64% passed. The pass rates for those that waited at least until the spring/summer semester were not significantly different. Even students who waited to take the course until 1998 had comparable pass rates.

For the students who passed developmental math and then went on to take college-level math, 60% enrolled in the college-level course in Winter 1996. The remaining 40% took it after Winter 1996, with most taking it in either Fall 1996 or Winter 1997. For those students who enrolled in college-level math in the Winter 1996 semester, 52% passed. For those students who waited until a later semester to enroll, their pass rates were slightly higher than 52%. Therefore, taking the college-level math course directly after finishing the developmental course appears to make no difference in whether the student passes.

For the students who passed developmental reading and then went on to take political science, 34% took political science in the Winter 1996 semester. The remaining students took political science sometime after the Winter 1996 semester, with 45% taking it in either Fall 1996 or Winter 1997. For those students who took political science in Winter 1996, 69% passed. The pass rates for students who took political science in subsequent semesters varied somewhat, but were not statistically significantly different from the pass rate in the Winter 1996 semester.

The following two figures summarize the paths taken by the students who enrolled in developmental English and in developmental math in or after Fall 1995. Of the 1,182 students

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[7] Pearson Chi-Square value for the difference between those who passed developmental English and those who failed = 25.54; Pearson Chi-Square value for the difference between those who passed developmental math and those who failed = 43.32; Pearson Chi-Square value for the difference between those who passed developmental reading and those who failed = 7.50.

who enrolled in developmental English, 379 (32%) had gone on to pass non-developmental English sometime between Winter 1996 and Fall 1998. Of the 1,536 students who enrolled in developmental math, 223 (15%) had gone on to pass non-developmental math sometime between Winter 1996 and Fall 1998. It is important to consider that students who pass developmental English and/or developmental math may be enrolling in courses other than college-level English or college-level math. In addition, the next section presents information on retention and it is also important to note that despite the attrition rates displayed by Figures 2 and 3, developmental students are still more likely to be retained longer at the institution than non-developmental students.

Figure 2
Paths of Developmental English Students from Fall 1995 – Fall 1998

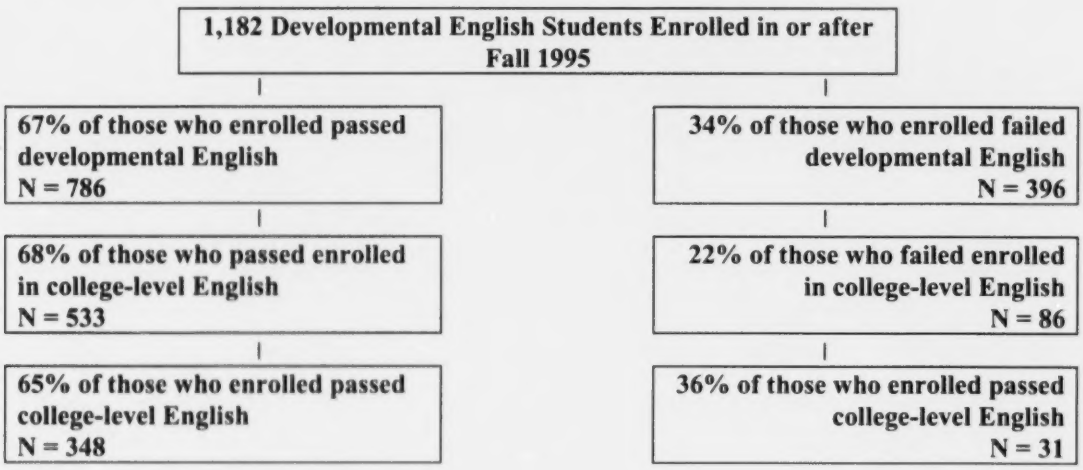
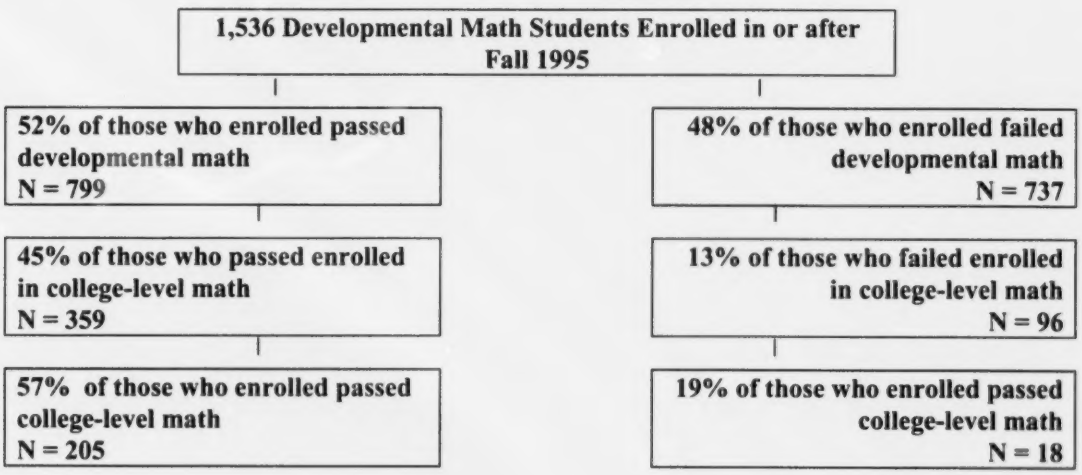

1,182 Developmental English Students Enrolled in or after Fall 1995
67% of those who enrolled passed developmental English
N = 786
34% of those who enrolled failed developmental English
N = 396
68% of those who passed enrolled in college-level English
N = 533
22% of those who failed enrolled in college-level English
N = 86
65% of those who enrolled passed college-level English
N = 348
36% of those who enrolled passed college-level English
N = 31

Figure 3
Paths of Developmental Math Students from Fall 1995 – Fall 1998


1,536 Developmental Math Students Enrolled in or after Fall 1995
52% of those who enrolled passed developmental math
N = 799
48% of those who enrolled failed developmental math
N = 737
45% of those who passed enrolled in college-level math
N = 359
13% of those who failed enrolled in college-level math
N = 96
57% of those who enrolled passed college-level math
N = 205
19% of those who enrolled passed college-level math
N = 18

Research Question Three

Research Question Three asks how developmental students compare to non-developmental students on specified variables. Table 4 presents differences between these two groups of students on GPA, credits completed to credits attempted, and on the last semester they attended their institution.

Table 4. Comparisons of Developmental to Non-Developmental Students on GPA, Credits Completed to Credits Attempted, and Last Semester Attended

	GPA	Credits Completed to Credits Attempted	Last Semester Attended*
Developmental (n=2,238)	1.95	.70	6.09
Non-Developmental (n=2,168)	2.46	.79	5.74
T value	-14.513**	-8.629**	3.569**

*5=Fall 1996; 6=Winter 1997; 7=Spring/Summer 1997
**$p<.0001$

Table 4 demonstrates that non-developmental students have higher GPAs and have completed more of the credits they attempted. Developmental students, on the other hand, were significantly more likely to have remained enrolled at their institution longer. Figure 4 and Table 5 present more details on the last semester attended. Although there is a difference in attendance patterns between developmental and non-developmental students, their patterns are strikingly similar.

Figure 4. Last Semester Attended for Developmental and Non-Developmental Students

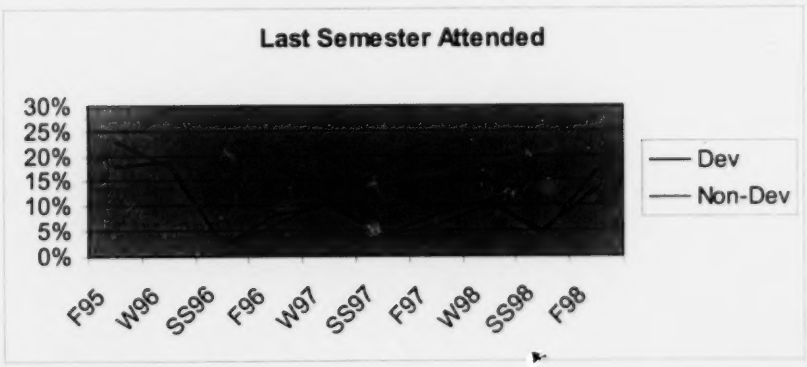


Table 5. Percentages of Students by Their Last Semester of Enrollment at Their Institution

Last Semester	Developmental	Non-Developmental
Fall 1995	18%	23%
Winter 1996	19%	18%
Spring/Summer 1996	2%	2%
Fall 1996	8%	6%
Winter 1997	10%	11%
Spring/Summer 1997	4%	4%
Fall 1997	8%	6%
Winter 1998	11%	10%
Spring/Summer 1998	4%	5%
Fall 1998	17%	13%

Both a high GPA and being a developmental student are correlated with having a higher last semester attended at the institution. Based on regressing last semester attended on both GPA and developmental status, GPA is a stronger predictor (b = .32) than developmental status (b = -.12) indicating that a non-developmental student with a high GPA would be more likely to remain at the institution longer than a developmental student with a low GPA. If the GPAs are relatively equal, it is more likely that the developmental student will remain at the institution longer.

Before attempting to answer the question of whether developmental and non-developmental students had similar pass rates in non-developmental courses, it is interesting to note that pass rates in the non-developmental courses are very similar to those for the developmental courses. For the total population of students in our database, 68% passed non-developmental English, 55% passed non-developmental math, and 64% passed political science.

The following table presents the pass rates in non-developmental courses for non-developmental students and for developmental students who had passed their developmental course prior to enrolling in the non-developmental course.

Table 5. Pass Rates in Non-Developmental Course by Developmental Status

		Non-Developmental Course		
	English N=2,022	**Math N=1,430**	**Political Science N=921**	**English (reading) N=1,751**
Developmental	65% (of 533)	57% (of 359)	65% (of 162)	59% (of 262)
Non-Developmental	71% (of 1,489)	60% (of 1,071)	69% (of 759)	71% (of 1,489)
T value	-2.283*	Not significant	Not significant	-3.654**

*p Significant @ <.05, **p significant @ < .0001

Note: Numbers in parentheses are number of students who enrolled in college-level course.

Table 5 demonstrates that there is no significant difference between students who pass their developmental courses and non-developmental students in how they perform in their first college-level math and political science courses. However, students who never enrolled in a developmental course do perform better in college-level English courses than do those students who passed either developmental English or developmental reading prior to enrolling in college-level English.

Research Question Four

Research Question Four asks what institutional practices and structures correlate with performance of developmental education students. We were hopeful that we could find a way to link support services and instructional modes to student success. However, in examining these variables from the 1997 study, we realized that it was impossible to link these services to developmental student success. We do not know if the developmental students at these institutions actually used these services—only that they were offered by the institution.

Nonetheless, we did attempt to determine if there was an effect of institutional size. In order to compare groups of institutions and to remain consistent with the 1997 Developmental Education study, we categorized institutions into the same groups used then. Table 6 presents these groups, the institutions within each group, the number of students in the sample sizes of the combined institutions and some outcomes associated with each group. All of the listed outcomes have been determined to have a statistically significant difference at the .05 level. However, we have not determined significant differences between each group. In other words, Group 1 has the lowest last semester attended and Group 4 had the highest last semester attended. The difference between Group 1 and Group 4 is significant. However, we do not know how Group 1 and Group 2 differ on this regard[8].

[8] Determining differences between groups can be run doing post-hoc analyses in ANOVAs. We have not run these tests, in order to present a simple table.

Table 6. Institutional Groups and Outcomes

Group	Institutions	# of Students in Sample	Outcomes
Group 1	Alpena Bay de Noc Glen Oaks Mid Michigan Montcalm North Central West Shore Gogebic	782	1. Developmental students are most likely to pass subsequent non-developmental English courses 2. Developmental students have the lowest last semester attended
Group 2	Jackson Lake Michigan Monroe Northwestern St. Clair Southwestern Muskegon	1,039	1. Students are most likely to pass developmental math 2. Students are most likely to pass all of the developmental courses they enroll in.
Group 3	Delta Grand Rapids Henry Ford Kalamazoo Valley Mott Schoolcraft Washtenaw Wayne County	1,564	1. Developmental students are most likely to pass a subsequent non-developmental math course 2. Developmental students have the lowest credits completed to credits attempted ratio 3. Students are least likely to pass developmental English
Group 4	Lansing Macomb Oakland	569	1. Developmental students' GPA's are highest 2. Developmental students' credits completed to credits attempted ratio is highest 3. The last semester attended for developmental students is highest 4. Students are least likely to pass all of the developmental courses they enroll in 5. Students are least likely to pass developmental math
Group 5	Ferris Lake Superior Northern Michigan University	452	1. Students are most likely to pass developmental English 2. Developmental students are least likely to pass subsequent non-developmental English 3. Developmental students are least likely to pass subsequent non-developmental math 4. Developmental students' GPA is lowest

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While it is interesting to look at the success of developmental students by institutional grouping, this table stimulates more questions than answers. It is impossible to know at this point, why students do better in some institutional groupings than in others. Does size make a difference? We ran correlations between developmental student success variables and enrollment numbers, but did not find any significant correlations.

In addition to size, we decided to see if we could find effects from centralization of developmental education activities, processes, and efforts and from mandatory placement policies. The following two tables presents these results. In these tables, we also included comments from the results of the analyses based on the institutional groups.

Table 7. Correlations Between Centralization of Developmental Efforts and Developmental Students' Performance

Institutional Structure or Practice	Correlation with Developmental Student Success	Comments Related to Grouping
Centralization of Developmental Efforts	1. Developmental students' GPA is lower 2. Developmental students' credits completed to credits attempted ratio is lower 3. Developmental students' last semester attended is lower 4. Students were less likely to have passed developmental math	Groups 3 and 4 had no institutions that said their developmental efforts were centralized. In Groups 3 and 4, GPA's are highest, credits completed are highest, and last semester attended is highest. Group 5 had the most students who attended institutions that said their developmental efforts were centralized. For these students, their GPA was highest.

Based on the results of the 1997 study, 31% of the responding institutions said their developmental efforts were centralized (30 institutions responded to the 1997 survey). In this table, centralization of developmental efforts is negatively correlated with many aspects of developmental student success. Again, this finding brings more questions than answers. The column on institutional grouping outcomes is provided to show that it may be something about the institutions other than centralization that is related to developmental student success. Future studies on the role of centralization may be warranted.

Table 8. Correlations Between Mandatory Placement and Developmental Students' Performance

Institutional Structure or Practice	Correlation with Developmental Student Success	Comments Related to Grouping
Mandatory Placement in Reading	There is no difference in passing reading or in passing subsequent political science.	
Mandatory Placement in Writing	1. There is no difference in passing developmental English. 2. Students are less likely to pass subsequent college-level English	All of Group 5 has mandatory placement in writing.
Mandatory Placement in Math	There is no difference in passing developmental math or subsequent college-level math	

Based on data from the 1997 study, 44% of responding institutions had mandatory placement in reading, 56% had mandatory placement in writing, and 48% had mandatory placement in math. In institutions with mandatory placement in reading, students are no more or no less likely to pass developmental reading or subsequent political science than are students in institutions without mandatory placement in reading. In institutions with mandatory placement in math, students are no more or no less likely to pass developmental math or subsequent college-level math than are students in institutions without mandatory placement in math. In institutions with mandatory placement in writing, students are no more or less likely to pass developmental English, but they are less likely to pass subsequent college-level English than are students in institutions without mandatory placement in writing. All of the institutions in Group 5 have mandatory placement in writing and students in these institutions were least likely to pass subsequent college-level English.

SUMMARY

The results of this study provide a description of how developmental students perform in Michigan's associate degree-granting institutions. In terms of passing their courses, it is most common for students to pass all of the developmental courses they enroll in (52% fit in this pattern), followed by not passing any of the courses they enrolled in (33% fit this description). Very few students (only 15%) pass one or more of their developmental courses while failing one or more developmental course. The students who do pass their developmental courses do better in college-level courses than the students who fail their developmental courses and still enroll in college-level courses. This is true for all three academic subjects we examined.

In terms of comparing developmental students to non-developmental students, non-developmental students have higher GPA's and complete more of the credits they attempt. Developmental students, on the other hand, are significantly more likely to remain enrolled at their institution longer. Although there is a difference in attendance patterns between developmental and non-developmental students, their patterns are strikingly similar. In terms of passing college-level courses, non-developmental students are no more likely to pass college-level math than are developmental students who pass their developmental math course before enrolling in the college-level math course. Neither are non-developmental students more likely to pass political science than are developmental students who have passed their developmental reading course. However, this pattern changes with college-level English. Non-developmental students are more likely to pass college-level English than are developmental students who have passed either developmental English or reading.

Further study is needed to relate developmental student success to institutional structures and policies. In this study, we found that grouping by enrollment resulted in no one group standing out as having the greatest success in developmental education. Although there are indications that centralized efforts and mandatory placement policies make no difference in helping developmental students, further studies are needed in these areas.

There are several limitations to this study. First, we defined developmental students as those who were enrolled in a developmental course sometime between Fall 1995 and Fall 1998. There may have been students who tested as developmental but opted out of taking developmental courses. These students may not only have been excluded from the developmental group, but may have been included in the non-developmental group. There was also a limitation in our analyses on full- versus part-time status. We only captured enrollment status in the Fall 1995 semester and students may well change their enrollment status from semester to semester. Third, we did our analyses only on pass rates, ignoring the

actual grades students received which could provide a finer level of detail. Also, in these pass rates, we included students who withdrew. Some students were passing at the time of withdrawal, but we did not have information on withdrawal/passing grades from all institutions. Finally, we examined retention rates in the absence of knowledge on the students' goals. It is likely that students have specific goals in mind when attending these institutions and, for example, they may never intend to be enrolled for more than one semester.

APPENDICES

Appendix A

Public Institutions in State of Michigan Who Were Invited to Participate in the Study

Alpena Community College
Bay de Noc Community College
Delta College
Ferris State University
Glen Oaks Community College
Gogebic Community College
Grand Rapids Community College
Henry Ford Community College
Jackson Community College
Kalamazoo Valley Community College
Kellogg Community College
Kirtland Community College
Lake Michigan College
Lake Superior State University
Lansing Community College
Macomb Community College
Michigan Technological University
Mid Michigan Community College
Monroe County Community College
Montcalm Community College
Mott Community College
Muskegon Community College
North Central Michigan College
Northern Michigan University
Northwestern Michigan College
Oakland Community College
Schoolcraft College
Southwestern Michigan College
St. Clair County Community College
Washtenaw Community College
Wayne County Community College
West Shore Community College

Appendix B

Matrix for Recording Data on Developmental Students

Matrix for Recording Data on Non-Developmental Students

Appendix C

Sample Sizes by Institution

	Developmental	Non-Developmental
Alpena Community College	50	50
Bay de Noc Community College	50	50
Delta College	100	100
Ferris State University	100	100
Glen Oaks Community College	50	50
Gogebic Community College	50	50
Grand Rapids Community College	100	100
Henry Ford Community College	100	100
Jackson Community College	75	75
Kalamazoo Valley Community College	100	100
Kellogg Community College	--	--
Kirtland Community College	--	--
Lake Michigan College	75	75
Lake Superior State University	75	34
Lansing Community College	100	100
Macomb Community College	100	100
Michigan Technological University	--	--
Mid Michigan Community College	50	50
Monroe County Community College	75	75
Montcalm Community College	50	50
Mott Community College	100	100
Muskegon Community College	75	75
North Central Michigan College	50	50
Northern Michigan University	75	75
Northwestern Michigan College	75	75
Oakland Community College	100	100
Schoolcraft College	100	100
Southwestern Michigan College	75	75
St. Clair County Community College	75	75
Washtenaw Community College	100	100
Wayne County Community College	100	100
West Shore Community College	50	50

Appendix D

Codebook for Variables Used in Study

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